AEROLOGICAL OBSERVATIONS

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Free-air temperatures were moderately above normal at practically all levels and stations. (Table 1.) The greatest departures (between 3° and 4°) from the normal occurred at Ellendale and Omaha. Free-air relative humidities were mostly above normal at Chicago, Cleveland, and Dallas and below normal at the other stations. The greatest negative departures (−15 per cent) occurred at the 1,000 and 2,000-meter levels at Washington.

At the 1,000-meter level the resultant wind velocities were appreciably above normal at most stations, except along the Pacific Coast where they were close to normal. (Table 2.) Resultant directions were near normal at practically all stations.

At the 4,000-meter level the resultant velocities exceeded the normals at most of the northern stations. The greatest departures from the normal directions occurred at the southern stations. The normal northerly component was replaced by a westerly one over the northern Gulf region, while at Key West, the resultant direction was easterly instead of the normal westerly.

In Table 3 are shown the average and extreme heights attained and the number of flights made during the month.

TABLE 1.—*Mean free-air temperatures and humidities obtained by airplanes (or kites) during October, 1931*

TEMPERATURE (°C.)

Altitude (meters) m. s. l.	Chicago, Ill.[1] (190 meters)	Cleveland, Ohio[1] (245 meters)	Dallas, Tex.[1] (149 meters)	Due West, S. C.[2] (217 meters)	Ellendale, N. Dak.[2] (444 meters)	Hampton Roads, Va.[3] (2 meters)	Omaha, Nebr.[1] (299 meters)	Pensacola, Fla.[3] (2 meters)	San Diego, Calif.[3] (9 meters)	Washington, D. C.[3] (2 meters)
Surface	11.1	10.5	17.8	15.8	9.2	16.5	11.2	20.6	20.9	12.7
500	12.0	11.6	19.4	15.9	9.5	16.6	11.8	18.9	17.7	13.9
1,000	11.1	11.2	18.8	13.6	10.3	14.3	12.2	17.2	16.2	12.6
1,500	8.8	8.5	16.1	11.0	8.2	------	10.7	------	------	------
2,000	6.6	6.2	13.6	8.8	6.2	9.7	8.5	12.8	12.5	9.1
2,500	4.0	4.0	11.3	6.2	3.7	------	6.2	------	------	------
3,000	1.3	1.6	8.6	4.0	0.7	4.3	3.3	8.1	7.3	3.9
4,000	−4.3	−3.5	2.5	−0.7	−4.8	------	−2.9	------	------	1.3
5,000	−9.8	−8.7	−3.1	−7.1	−11.2	------	−9.4	------	------	------
6,000	------	−14.2	------	------	------	------	−16.6	------	------	------

RELATIVE HUMIDITY (PER CENT)

Surface	83	81	83	70	71	80	83	81	65	78
500	74	73	71	61	68	65	76	76	65	60
1,000	67	66	63	58	55	63	64	74	57	52
1,500	61	64	60	54	51	------	58	------	------	------
2,000	55	56	56	50	45	48	53	59	44	48
2,500	51	50	50	48	45	------	48	------	------	------
3,000	51	47	45	37	48	32	50	49	36	43
4,000	49	42	40	33	47	------	45	------	------	36
5,000	38	41	32	32	59	------	43	------	------	------
6,000	------	43	------	------	------	------	43	------	------	------

[1] Airplanes (Weather Bureau). [2] Kites. [3] Airplanes (Navy).

TABLE 2.—*Free-air resultant winds (meters per second) based on pilot balloon observations made near 7 a. m. (E. S. T.) during October, 1931*

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,528 meters)		Brownsville, Tex. (12 meters)		Burlington, Vt. (132 meters)		Cheyenne, Wyo. (1,873 meters)		Chicago, Ill. (198 meters)		Cleveland, Ohio (245 meters)		Dallas, Tex. (154 meters)		Due West, S. C. (217 meters)		Ellendale, N. Dak. (444 meters)		Havre, Mont. (762 meters)		Jacksonville, Fla. (14 meters)		Key West, Fla. (11 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	N 45 E	0.9	N 83 E	0.5	S 13 W	1.9	N 77 W	4.2	S 50 W	2.5	S 20 W	2.1	S 31 E	1.7	N 7 W	0.3	N 65 W	2.7	S 79 W	2.4	N 8 E	1.6	N 58 E	2.7
500	------	----	S 43 E	5.0	S 49 W	4.8	------	----	S 62 W	7.4	S 59 W	5.5	S 1 W	7.0	N 60 W	1.5	N 68 W	3.3	------	----	N 55 E	4.4	N 79 E	7.2
1,000	------	----	S 39 E	5.2	N 81 W	3.1	------	----	S 79 W	6.9	S 88 W	6.8	S 17 W	7.2	N 31 W	1.1	N 65 W	5.4	S 84 W	5.7	N 75 E	2.3	S 89 E	.06
1,500	------	----	S 48 E	4.2	N 73 W	8.5	------	----	N 86 W	7.5	S 88 W	7.2	S 43 W	5.0	N 75 W	1.5	N 89 W	4.9	N 77 W	7.9	S 14 E	0.5	S 78 E	4.3
2,000	W	0.6	S 49 E	2.8	N 83 W	8.6	N 86 W	6.4	N 89 W	9.1	S 87 W	8.0	S 79 W	2.9	N 73 W	2.5	S 78 W	5.7	N 80 W	7.7	S 66 W	1.9	S 83 E	3.2
2,500	S 67 W	3.0	S 59 E	1.3	N 81 W	8.1	N 74 W	9.2	W	8.0	W	9.4	N 77 W	2.9	N 72 W	3.7	S 80 W	6.6	N 75 W	7.8	S 69 W	1.7	S 82 E	4.1
3,000	S 76 W	5.4	N 37 E	0.7	N 78 W	7.7	N 65 W	9.9	------	----	N 83 W	10.1	S 75 W	1.9	N 68 W	4.4	S 75 W	8.0	N 80 W	7.6	N 55 W	1.2	N 85 E	3.2
4,000	N 84 W	9.4	N 34 W	2.8	N 54 W	9.3	N 64 W	9.3	------	----	------	----	N 14 E	0.5	N 58 W	4.0	S 77 W	12.7	S 89 W	7.9	S 78 W	4.7	N 70 E	2.2
5,000	N 77 W	9.7	N 41 W	1.8	------	----	S 81 W	10.1	------	----	------	----	------	----	N 71 W	5.9	------	----	------	----	------	----	N 54 E	2.1

Altitude (meters) m. s. l.	Los Angeles, Calif. (127 meters)		Medford, Oreg. (410 meters)		Memphis, Tenn. (125 meters)		New Orleans, La. (25 meters)		Oakland, Calif. (8 meters)		Oklahoma, City, Okla. (392 meters)		Omaha, Nebr. (299 meters)		Phoenix, Ariz. (356 meters)		Salt Lake City, Utah (1,294 meters)		Sault Ste. Marie, Mich. (198 meters)		Seattle, Wash. (14 meters)		Washington, D. C. (10 meters)	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	°		°		°		°		°		°		°		°		°		°		°		°	
Surface	N 77 E	0.3	S 6 E	0.4	S 1 E	1.1	N 63 E	1.3	S 17 E	1.0	S 5 E	1.6	S 60 W	0.3	S 69 E	1.8	S 30 E	2.7	N 44 E	0.3	S 35 E	1.4	N 49 W	0.7
500	S 88 E	0.6	S 89 W	0.6	S 36 W	4.6	S 74 E	4.5	N 17 W	0.7	S 1 W	4.2	S 59 W	2.1	S 72 E	1.4	------	----	S 68 W	2.9	S 24 W	3.0	N 72 W	5.2
1,000	S 87 E	0.3	S 49 W	0.5	S 45 W	4.2	S 64 E	2.9	N 13 E	1.2	S 40 W	7.0	S 69 W	5.4	S 78 E	1.0	------	----	N 80 W	6.9	S 25 W	3.2	N 68 W	5.6
1,500	N 68 W	1.0	S 4 W	1.1	S 59 W	3.2	S 62 E	1.7	S 82 E	0.4	S 70 W	6.2	S 83 W	7.4	S 5 E	1.5	S 16 E	3.7	N 79 W	8.4	S 37 W	4.0	N 61 W	7.2
2,000	N 71 W	1.0	S 46 W	2.6	S 70 W	2.6	N 32 W	0.6	S 31 E	0.7	N 89 W	5.2	N 86 W	7.5	S 15 W	3.3	S 4 W	3.5	N 74 W	10.0	S 40 W	3.2	N 70 W	8.0
2,500	S 68 W	1.7	S 62 W	2.5	N 82 W	1.5	N 21 W	2.3	N 4 E	0.9	N 77 W	4.5	N 85 W	8.1	S 32 W	5.2	S 41 W	2.5	N 70 W	11.0	S 21 W	2.5	N 70 W	9.8
3,000	S 81 W	2.0	S 67 W	2.9	------	----	N 66 W	4.1	N 54 W	3.0	N 57 W	5.8	N 85 W	7.4	S 45 W	6.3	S 58 W	4.1	N 80 W	11.2	N 32 E	1.7	N 75 W	9.9
4,000	------	----	N 84 W	4.9	------	----	S 86 W	6.0	N 66 W	1.6	N 40 W	4.2	------	----	S 55 W	12.7	S 68 W	5.9	------	----	------	----	------	----
5,000	------	----	N 70 W	4.0	------	----	S 78 W	8.1	------	----	------	----	------	----	------	----	N 82 W	9.0	------	----	------	----	------	----

TABLE 3.—*Observations by means of airplanes, kites, captive and limited-height sounding balloons during October, 1931*

	Dallas, Tex.[1]	Due West, S. C.	Ellendale, N. Dak.	Chicago, Ill.[1]	Cleveland, Ohio[1]	Omaha, Nebr.[1]
Mean altitudes, meters, m. s. l., reached during month	5,416	3,010	3,493	4,775	5,742	6,317
Maximum altitude, meters, m. s. l., reached	5,763	[2] 5,477	[3] 5,682	5,284	6,329	6,712
Number of flights made	31	31	27	31	31	32
Number of days on which flights were made	31	31	26	31	31	31

[1] Airplanes. [2] Limited-height sounding balloon. [3] Kite.